

WHAT IS CLAIMED IS:

1. A modified alkylbenzene composition produced by a process, the process comprising the steps of:
 - a) passing a feed stream comprising a $C_8 - C_{28}$ acyclic paraffin having 2 or 3 primary carbon atoms and at least one other acyclic paraffin and having a first concentration of the acyclic paraffin having 2 or 3 primary carbon atoms to an adsorption zone comprising a bed of an adsorbent comprising silicalite at adsorption promoting conditions to selectively adsorb the acyclic paraffin having 2 or 3 primary carbon atoms, contacting the bed of adsorbent with a desorbent stream comprising at least one component selected from the group consisting of a C_5-C_8 cycloparaffin, a C_5-C_8 normal paraffin, and a C_5-C_8 branched paraffin and recovering from the adsorption zone an adsorption extract having a second concentration of the acyclic hydrocarbon having 2 or 3 primary carbon atoms that is greater than the first concentration;
 - b) passing at least a portion of the adsorption extract to a dehydrogenation zone, operating the dehydrogenation zone at dehydrogenation conditions sufficient to dehydrogenate the acyclic paraffin having 2 or 3 primary carbon atoms, and recovering from the dehydrogenation zone a dehydrogenated product stream comprising a $C_8 - C_{28}$ acyclic monoolefin having 2 or 3 primary carbon atoms;
 - c) passing a feedstock comprising a phenyl compound and passing at least a portion of the dehydrogenated product stream comprising the acyclic monoolefin to an alkylation zone, operating the alkylation zone at alkylation conditions sufficient to alkylate the phenyl compound with the acyclic monoolefin in the

5 presence of an alkylation catalyst to form phenyl-alkanes comprising molecules having one phenyl portion and one C₈-C₂₈ aliphatic alkyl portion; wherein the aliphatic alkyl portion has 2 or 3 primary carbon atoms and no quaternary carbon atoms except for any quaternary carbon atom bonded by a carbon-carbon bond with a carbon atom of the phenyl portion; and wherein the phenyl-alkanes have a selectivity to 2-phenyl-alkanes of from about 40 to about 100 and a selectivity to internal quaternary phenyl-alkanes of less than 10; and

10 d) recovering the phenyl-alkanes from the alkylation zone.

2. The composition of Claim 1 wherein the phenyl-alkanes have a selectivity to 2-phenyl-alkanes of from about 50 to about 100.

3. The composition of Claim 1 wherein the phenyl-alkanes have a selectivity to 2-phenyl-alkanes of from about 60 to about 100.

15 4. The composition of Claim 1 wherein the phenyl-alkanes have a selectivity to internal quaternary phenyl-alkanes of less than about 8.

5. The composition of Claim 1 wherein the phenyl-alkanes have a selectivity to internal quaternary phenyl-alkanes of less than 5.

20 6. The composition of Claim 1 further characterized in that the phenyl-alkanes have a selectivity to phenyl-alkanes having an aliphatic alkyl portion containing a quaternary carbon atom not bonded by a carbon-carbon bond with a carbon atom of the phenyl portion of less than 1.

25 7. The composition of Claim 1 further characterized in that the acyclic paraffin having 2 or 3 primary carbon atoms comprises a lightly branched paraffin and the feed stream has a concentration of the lightly branched paraffin of more than about 30 mol-%.

8. The composition of Claim 1 further characterized in that the process comprises simulating the use of a moving bed of adsorbent.

9. The composition of Claim 1 further characterized in that the acyclic paraffin having 2 or 3 primary carbon atoms comprises a monomethyl paraffin.
10. The composition of Claim 1 further characterized in that the desorbent stream comprises a compound selected from the group consisting of normal pentane, normal hexane, methylcyclohexane, a cyclopentane, and isooctane.
11. The composition of Claim 1 further characterized in that the alkylation catalyst comprises a zeolite having a zeolite structure type selected from the group consisting of BEA, MOR, MTW, and NES.
12. The composition of Claim 1 further characterized in that the acyclic paraffin having 2 or 3 primary carbon atoms comprises a normal paraffin and the adsorption extract stream has a concentration of the normal paraffin of less than about 75 mol-%.
13. The composition of Claim 1 further characterized in that the acyclic monoolefin having 2 or 3 primary carbon atoms comprises a lightly branched olefin having 3 primary carbon atoms and that the at least a portion of the dehydrogenated product stream has a concentration of the lightly branched olefin of more than 85 mol-%, based on the total lightly branched olefins in the at least a portion of the dehydrogenated product stream.
14. The composition of Claim 1 further characterized in that a makeup stream comprising nonbranched paraffins passes to the dehydrogenation zone.
15. The composition of Claim 1 further characterized in that the acyclic paraffin having 2 or 3 primary carbon atoms comprises a normal paraffin and the feed stream has a concentration of the normal paraffin of more than 0.3 mol-%.

16. A modified alkylbenzene sulfonate composition produced by a process, the process comprising the steps of:

- 5 a) passing a feed stream comprising a $C_8 - C_{28}$ acyclic paraffin having 2 or 3 primary carbon atoms and at least one other acyclic paraffin and having a first concentration of the acyclic paraffin having 2 or 3 primary carbon atoms to an adsorption zone comprising a bed of an adsorbent comprising silicalite at adsorption promoting conditions to selectively adsorb the acyclic paraffin having 2 or 3 primary carbon atoms, contacting the bed of adsorbent with a desorbent stream comprising at least one component selected from the group consisting of a C_5-C_8 cycloparaffin, a C_5-C_8 normal paraffin, and a C_5-C_8 branched paraffin and recovering from the adsorption zone an adsorption extract having a second concentration of the acyclic hydrocarbon having 2 or 3 primary carbon atoms that is greater than the first concentration;
- 10 b) passing at least a portion of the adsorption extract to a dehydrogenation zone, operating the dehydrogenation zone at dehydrogenation conditions sufficient to dehydrogenate the acyclic paraffin having 2 or 3 primary carbon atoms, and recovering from the dehydrogenation zone a dehydrogenated product stream comprising a $C_8 - C_{28}$ acyclic monoolefin having 2 or 3 primary carbon atoms;
- 20 c) passing a feedstock comprising a phenyl compound and passing at least a portion of the dehydrogenated product stream comprising the acyclic monoolefin to an alkylation zone, operating the alkylation zone at alkylation conditions sufficient to alkylate the phenyl compound with the acyclic monoolefin in the presence of an alkylation catalyst to form phenyl-alkanes comprising molecules having one phenyl portion and one C_8-C_{28}
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- aliphatic alkyl portion; wherein the aliphatic alkyl portion has 2 or 3 primary carbon atoms and no quaternary carbon atoms except for any quaternary carbon atom bonded by a carbon-carbon bond with a carbon atom of the phenyl portion; and wherein the phenyl-alkanes have a selectivity to 2-phenyl-alkanes of from about 40 to about 100 and a selectivity to internal quaternary phenyl-alkanes of less than 10;
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- d) withdrawing an alkylate product stream comprising the phenyl-alkanes from the alkylation zone and contacting at least a portion of the alkylate product stream with a sulfonating agent at sulfonation conditions sufficient to sulfonate phenyl-alkanes and to produce a sulfonated product stream comprising phenyl-alkane sulfonic acids; and
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- e) contacting at least a portion of the sulfonated product stream with a neutralizing agent at neutralization conditions sufficient to neutralize phenyl-alkane sulfonic acids and to produce phenyl-alkane sulfonates.
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17. A modified alkylbenzene composition produced by a process, the process comprising the steps of:
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- a) passing a feed stream comprising a desired monomethyl paraffin and a raffinate compound to a bed of an adsorbent comprising silicalite, wherein the adsorbent selectively retains the monomethyl paraffin, wherein the bed is located in a continuous simulated moving bed adsorptive separation zone comprising an adsorbent chamber containing a number of compartmentalized beds of the adsorbent, and wherein the compartmentalized beds are separated by transfer points for streams used in the process, and withdrawing a raffinate stream comprising the raffinate compound from the adsorbent chamber;
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- 5 b) passing a desorbent stream comprising at least one desorbent selected from the group consisting of a C₅-C₈ cycloparaffin, a C₅-C₈ normal paraffin, and a C₅-C₈ branched paraffin, to the adsorbent chamber, and removing an extract stream comprising the desorbent and the desired monomethyl paraffin from the adsorbent chamber;
- 10 c) periodically incrementing the transfer points in the adsorbent chamber of the feed, desorbent, extract, and raffinate streams to simulate countercurrent movement of the beds of adsorbent and the feed stream;
- 15 d) passing at least a portion of the extract stream to a dehydrogenation zone, operating the dehydrogenation zone at dehydrogenation conditions sufficient to dehydrogenate the monomethyl paraffin, and recovering from the dehydrogenation zone a dehydrogenated product stream comprising a monomethyl monoolefin;
- 20 e) passing a feedstock comprising benzene and passing at least a portion of the dehydrogenated product stream comprising the monomethyl monoolefin to an alkylation zone, operating the alkylation zone at alkylation conditions sufficient to alkylate benzene with the monomethyl monoolefin in the presence of an alkylation catalyst to form phenyl-alkanes comprising molecules having one phenyl portion and one aliphatic alkyl portion; wherein the aliphatic alkyl portion has 2 or 3 primary carbon atoms and no quaternary carbon atoms except for any quaternary carbon atom bonded by a carbon-carbon bond with a carbon atom of the phenyl portion; and wherein the phenyl-alkanes have a selectivity to 2-phenyl-alkanes of from about 40 to about 100 and a selectivity to internal quaternary phenyl-alkanes of less than 10 and a selectivity to phenyl-alkanes
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having an aliphatic alkyl portion containing a quaternary carbon atom not bonded by a carbon-carbon bond with a carbon atom of the phenyl portion of less than 1; and

f) recovering the phenyl-alkanes from the alkylation zone.

- 5 18. The composition of Claim 17 wherein the phenyl-alkanes have a selectivity to 2-phenyl-alkanes of from about 50 to about 100.
19. The composition of Claim 17 wherein the phenyl-alkanes have a selectivity to 2-phenyl-alkanes of from about 60 to about 100.
20. The composition of Claim 17 wherein the phenyl-alkanes have a
10 selectivity to internal quaternary phenyl-alkanes of less than about 8.
21. The composition of Claim 17 wherein the phenyl-alkanes have a selectivity to internal quaternary phenyl-alkanes of less than 5.